2013

Fourteenth Kenneth C. Schraut Memorial Lecture (Poster)

University of Dayton. Department of Mathematics

Undergraduate Mathematics Day

at the University of Dayton

Sunday, November 3, 2013

- **An undergraduate mathematics conference**
- **Contributed 15-minute talks, especially by undergraduate students, on mathematics research, mathematics education, history of mathematics, and applications of mathematics**
- **Two invited addresses**
- **Electronic conference proceedings**
- **No registration fee, complimentary breakfast and lunch**
- **Limited support for housing**

Registration and information: http://go.udayton.edu/mathevents
More questions? Contact mathevents@udayton.edu

The Fourteenth Annual Schraut Memorial Lecture

Thomas Bohman, Carnegie-Mellon University

Randomness and Pseudorandomness in Combinatorics

Randomness has long played a role in combinatorics in the context of the probabilistic method. This method was pioneered by Paul Erdos, is based on the study of probability spaces populated with combinatorial objects, and is used to prove the existence of combinatorial objects that are otherwise difficult to find. A fixed combinatorial structure has a pseudorandom property if it resembles a corresponding random object in some way. This notion is surprisingly powerful. Many recent recent advances in combinatorics follow from the study of pseudorandom properties of large combinatorial objects. In this talk we trace some of the history of these developments, with an emphasis applications of these ideas in Ramsey theory.

Sarah Miner More, McDaniel College

Reasoning About Secrets

Suppose that three friends, Alice, Bob, and Charlie, each have some secret information: Alice knows secret A, Bob knows secret B, and Charlie knows secret C. Some pairs of these secrets are subject to interdependencies between their values, while others are not. For example, suppose that the value of A completely determines the value of B. (In this case, we say that B "functionally depends" on A.) On the other hand, suppose that any possible value of A may coexist with any possible value of C. (Here, we say that A and C are "independent" secrets.) Given these two facts, can you conclude that Bob cannot predict Charlie's secret? How do you know? We study these independence and functional dependence relations on secrets. In this presentation, I will describe a logical system that is a sound and complete axiomatization of the properties that connect the two relations. This work is joint with Pavel Naumov and former McDaniel undergraduates Rob Kelvey and Ben Sapp.

Undergraduate Mathematics Day is supported by the Department of Mathematics of the University of Dayton, the College of Arts & Sciences and by mathematics alumni through the Schraut Memorial Lecture Fund.